

## Claims

What is claimed is:

1. A method for wirelessly providing software updates to a target module located in a work machine, comprising:
  - determining whether a software update condition exists for software stored in the target module;
  - delivering software update data from a remote off-board system to the work machine when a software update condition exists; and
  - performing an update process by the work machine including:
    - determining, at the work machine, a location of the target module,
    - determining whether an update delay condition exists,
    - delivering the software update to the target module if no update delay condition exists, and
    - delaying the delivery of the software update data to the target module if an update delay condition does exist.
2. The method of claim 1, wherein determining the location of the target module includes:
  - determining whether the target module is located on a primary data link or a secondary data link.
3. The method of claim 2, wherein when the target module is located on the primary data link, delivering, without delay, the software update to the target module.

4. The method of claim 2, wherein when the target module is located on the secondary data link, delivering the software update to the target module only if there is no update delay condition.

5. The method of claim 2, wherein when the target module is located on the primary data link, delivering, without delay, the software update to the target module only if there is no update delay condition.

6. The method of claim 1, wherein an update delay condition includes at least one of:

- (i) a condition where the target module is incapable of receiving the software update at that time;
- (ii) a condition where an interface control system that manages distribution of the software update within the work machine is incapable of delivering the software update at that time; and
- (iii) a condition where the target module is located on a secondary data link that has transmission characteristics different than those of a primary data link connected to the interface control system.

7. The method of claim 1, wherein delivering the software update to the target module if no update delay condition exists includes:

receiving the software update at an interface control system within the work machine that manages the delivery of software updates for the work machine; and

forwarding, by the interface control system and without delay, the software update to the target module.

8. The method of claim 1, wherein delaying the delivery of the software update data includes:

receiving the software update at an interface control system within the work machine that manages the delivery of software updates for the work machine;

storing the software update data in a memory device associated with the interface control system; and

monitoring the update delay condition to determine when to deliver the software update data to the target module.

9. The method of claim 1, wherein determining whether an update delay condition exists includes:

receiving an indication from the target module reflecting a condition that it cannot process software updates at the time of receiving the indication.

10. The method of claim 1, wherein the work machine includes an interface control system that receives the software update data delivered from the off-board system, and wherein determining whether an update delay condition exists includes:

determining whether the target module is located on a data link that has a different transmission speed than a primary data link connected to the interface control system.

11. The method of claim 1, wherein determining whether a software update condition exists for software stored in the target module includes:

determining whether the target module is in need of a different version of software based on an identification of software that is currently stored in the target module.

12. The method of claim 1, further including:  
notifying a user associated with the work machine that the software update condition exists; and  
receiving an indication from the user regarding the notification.

13. The method of claim 12, wherein notifying the user includes:  
presenting the user with an indication that the off-board system will update software stored in the target module; and  
wherein receiving an indication from the user includes:  
receiving a rejection from the user for the software update;  
and  
automatically overriding the user's rejection by delivering the software update to the work machine.

14. The method of claim 1, wherein performing an update process includes:  
providing a notification message from the target module indicating a status of the delivery of the software update to the target module.

15. The method of claim 14, wherein the status of the delivery of the software update reflects one of a successful write of the software update to

the target module, and an unsuccessful write of the software update to the target module.

16. The method of claim 15, wherein when the notification message indicates an unsuccessful write of the software update, the notification message includes data reflecting a reason associated with the unsuccessful write of the software update.

17. A system for providing software updates, comprising:  
an off-board system including a memory for providing software update data associated with a target module over a wireless communication medium; and  
a work machine, remotely located from the off-board system, for receiving the software update data, the work machine including:  
an interface control system connected to a primary data link and a secondary data link, and  
the target module,  
wherein the interface control system is configured to receive the software update data, determine the location of the target module, determine whether an update delay condition exists, and either delay a delivery of the software update data to the target module when an update condition exists, or deliver, without delay, the software data to the target module over the secondary data link.

18. The system of claim 17, wherein the interface control system is configured to determine the location of the target module by:  
determining whether the target module is connected to the primary or secondary data link.

19. The system of claim 18, wherein when the target module is connected to the primary data link, the interface control system delivers, without delay, the software update to the target module.

20. The system of claim 18, wherein when the target module is connected to the secondary data link, the interface control system delivers, without delay, the software update to the target module only if there is no update delay condition.

21. The system of claim 18, wherein when the target module is connected to the primary data link, the interface control system delivers, without delay, the software update to the target module only if there is no update delay condition.

22. The system of claim 17, wherein the update delay condition includes at least one of:

- (i) a condition where the target module is incapable of receiving the software update at that time;
- (ii) a condition where an interface control system that manages distribution of the software update within the work machine is incapable of delivering the software update at that time; and
- (iii) a condition where the target module is located on a secondary data link that has transmission characteristics different than those of a primary data link connected to the interface control system.

23. The system of claim 17, wherein the interface control system delays the delivery of the software update data by storing the software update data in a memory device associated with the interface control system, and monitors the update delay condition to determine when to deliver the software update data to the target module.

24. The system of claim 17, wherein the target module is configured to send an indication reflecting a condition that it cannot process software updates at the time of sending the indication to the interface control system.

25. The system of claim 24, wherein the interface control system uses the indication to determine whether an update delay condition exists.

26. The system of claim 17, wherein the primary and secondary data links have different transmission characteristics, and wherein the interface control system determines whether an update delay condition exists by detecting that the target module is connected to the secondary data link.

27. The system of claim 17, wherein the off-board system is configured to determine whether the target module is in need of a new version of software based on an identification of software that is currently stored in the target module.

28. The system of claim 17, wherein the off-board system is configured to notify a user associated with the work machine that the target module requires a software update, and receive an indication from the user regarding the notification.

29. The system of claim 28, wherein the off-board system notifies the user by presenting the user with an indication that the off-board system will update software stored in the target module.



30. The system of claim 29, wherein the off-board system is configured to receive a rejection from the user regarding the software update, and automatically override the user's rejection by delivering the software update to the work machine.

31. The system of claim 17, wherein the target module is further configured to provide a notification message indicating a status of the delivery of the software update to the target module.

32. The system of claim 17, wherein the status of the delivery of the software update reflects one of a successful write of the software update to the target module, and an unsuccessful write of the software update to the target module.

33. The method of claim 32, wherein when the notification message indicates an unsuccessful write of the software update, the notification message includes data reflecting a reason associated with the unsuccessful write of the software update.

34. A system for providing software updates, comprising:  
an off-board system including a memory for providing software update data associated with a target module over a wireless communication medium;

a first work machine, located within wireless communication range of the off-board system, and including a first interface control system; and

a second work machine, located outside the wireless communication range of the off-board system and within wireless communication range of the first work machine, the second work machine including:

a second interface control system connected to a primary data link and a secondary data link, and

the target module,

wherein the off-board system is configured to identify the first work machine as a relay work machine for the software update data, send the software update data to the first work machine and the first interface control system is configured to forward the software update module to the second work machine, and the second interface control system is configured to receive the software update data, determine the location of the target module, determine whether an update delay condition exists, and either delay a delivery of the software update data to the target module when an update condition exists, and deliver, without delay, the software data to the target module over the secondary data link.

35. An interface control system located in a work machine and connected to a primary data link and a secondary data link connected to a target module, comprising:

a processing device; and

a memory device including program instructions for performing a software update process when executed by the processing device, the software update process including:

receiving a software update for the target module from a remote off-board system that wirelessly transmits the software update to a communication module within the work machine,

determining a location of the target module,

determining whether an update delay condition exists,

delivering the software update to the target module when there is no update delay condition, and  
delaying the software update to the target module when there is an update delay condition.

36. An off-board system including:  
a processing device; and  
a memory device including instructions for performing a software update process, when executed by the processing device, the software update process including:  
determining whether a software update condition exists for a target module within a work machine, and  
sending the software update to the work machine when the software update condition does exist,  
wherein the work machine is configured to deliver, without delay, the software update to the target machine when an update delay condition does not exist, and to delay the delivery of the software update to the target device when the update delay condition does exist.

37. A system for wirelessly providing software updates to a target module located in a work machine, comprising:  
means for determining whether a software update condition exists for software stored in the target module;  
means for delivering software update data from a remote off-board system to the work machine when a software update condition exists;  
means for determining, at the work machine, a location of the target module;  
means for determining whether an update delay condition exists;

means for delivering the software update to the target module if no update delay condition exists; and

means for delaying the delivery of the software update data to the target module if an update delay condition does exist.